

SUPPORTIVE UPPER BODY CONSTRAINT DEVICE

Field of the Invention

This invention relates generally to the field of durable medical equipment and more particularly without limitation to a supportive upper body constraint device for supporting a user's upper body in a reclined position while constraining lateral movement of the user's upper body.

Background of the Invention

There are a number of physical ailments or conditions requiring a person to rest or sleep on their back in a partially reclined upright position. Sleep disorders such as apnea and snoring often times can only be controlled or prevented by such an upright reclined position. Surgical procedures such as back or shoulder surgery typically require such post-operative sleeping and resting posture in order to properly support the body while convalescing. Recovery from rotator cuff surgery, for example, typically involves about a four-week regimen of sleeping in a sling and being constrained in some manner to prevent rolling over onto the surgically repaired shoulder.

One solution widely used is propping the person up on several stacked pillows. There are at least a couple of disadvantages to this solution. First, the person will typically attempt to roll laterally to one side or the other as part of the normal sleep pattern. Because the pillows don't provide adequate lateral constraining support, this can cause excruciating pain and damage to the body when the person is in post-operative care, particularly in the case of a post-operative shoulder recovery. Second, because the pillows lack sufficient resiliency, even when staying in a position reclining on their back, typically one or more pillows will compress under the user's

body weight and fail to provide comfortable support necessary to prevent undue stress on muscles and joints.

Especially because of the former problem above, it is not unusual for a doctor to recommend that a shoulder-surgery patient sleep in a reclining chair for a time while convalescing. This is because the reclining chair provides sufficient lateral support, preventing the patient from rolling onto or imparting strain onto the shoulder joint. Although sleeping in a recliner provides lateral support, this benefit comes at the expense of a restful night of sleep because the reclining chair does not offer a comfortable sleeping position for an extended time. The reclining chair constrains not only the upper body, necessarily so, but also constrains the lower body and legs in an awkward partially-bent posture that is not conducive to repositioning during sleep or rest for comfort sake. This lack of comfort typically leads to the loss of sleep, which can be detrimental to the patient's timely recovery and return to normal activities.

It has been determined, however, that a longitudinally disposed wedge-shaped supportive device comprising opposing laterally directed support members can be constructed to provide an improved solution to this problem. The longitudinally disposed wedge-shaped portion can be placed onto a bed or other supporting surface for supporting the upper body. The opposing laterally directed support members cradle the upper body to constrain lateral movement. Although the upper body is constrained laterally, the lower body and legs are supported by the bed or other supporting surface and are therefore substantially freely repositionable for better comfort. The device comprises a relatively higher-density supporting portion for resiliency with a relatively lesser-density covering continuously conforming and adjusting to the upper body shape. The covering preferably comprises an elastomeric foam type of material with a smooth engagement surface to envelop the upper body, providing continuous engagement and thereby continuous support of a joint such as a shoulder joint. It has been observed that such a device offers upper body lateral support better than that of a reclining chair and with far-better sleeping and resting

comfort. It is to these improvements and others as exemplified by the description that embodiments of the present invention are directed.

Summary of the Invention

The embodiments of the present invention contemplate a supportive upper body constraint device. The device comprises a base comprising a foam material with an impression load deflection (ILD) ratio greater than about 40, and a cover on the base comprising a smooth-surface foam material with an ILD ratio less than the base. In one embodiment the cover comprises an elastomeric foam material with an ILD ratio less than about 14. In one embodiment the cover comprises a foam material with a density in the range of about 3.8 to 4 pounds per cubic foot.

The device comprises opposing support members on the base, the cover supportingly disposed by the base and support members in a concave contour defining a cavity. In one embodiment the support members are wedge-shaped; alternatively the support members can be radially-shaped. The base and support members can be discretely made and joined together, or they can be unitarily constructed.

One aspect of the embodiments of the present invention contemplates a supportive upper body constraint device comprising a base and means supported by the base for constraining the upper body by imparting a supporting engagement continuously molding and adjusting to a shape of the upper body maintaining complete contiguous contact against the upper body. The means for constraining is characterized by a cover comprising a viscoelastic foam material. The means for constraining is characterized by opposing support members on the base supporting the cover in a concave contour defining a central cavity.

Brief Description of the Figures

FIG. 1 is an isometric view of a support device constructed in accordance with embodiments of the present invention.

FIG. 2 is a front end view of the support device of FIG. 1.

FIG. 3 is a rear end view of the support device of FIG. 1.

FIG. 4 is a rear end view of a base constructed in accordance with alternative embodiments of the present invention.

FIG. 5 is a rear end view of a support members constructed in accordance with alternative embodiments of the present invention.

FIG. 6 is an isometric view of a support device constructed in accordance with alternative embodiments of the present invention.

FIG. 7 is a diagrammatic rear view of the support device cradling a user's upper body.

FIG. 8 is an enlarged detail of a portion of FIG. 7.

Detailed Description

FIG. 1 is an isometric view of a support device 100 constructed in accordance with an embodiment of the present invention. The support device 100 comprises a wedge-shaped base 102. The wedge shape provides for a somewhat upright reclining support for a user's upper body. The amount of incline can be preselected according to what the user desires. That is, a support device 100 used primarily for sleep might comprise a lesser incline than a support device 100 used for activities such as reading or watching television. It has been determined that the base 102 shown in FIG. 1 having about a thirty inch longitudinal surface 104 and an eight inch vertical surface 106 provides a comfortable incline for both sleeping and non-sleeping activities. It will be noted that the surface 104 of FIG. 1 is substantially square. These dimensions are illustrative only and not limiting as to the embodiments contemplated by the

present invention. Alternatively, in equivalent embodiments these dimensions for the base 102 can be selected based on the user's personal preference or body size.

FIG. 1 shows the support device 100 can be provided with a protective and/or decorative skin 109 (partially cutaway) such as a textile, leather or other like material. Preferably the skin 109 is easily removable by the use of fasteners such as cloth fasteners or zippers or the like for cleaning or changing it.

It will be noted that the upper surface against which a user reclines is of a concave contour defining a cavity 110 in which the user is cradled for constraining lateral support. FIGS. 2 and 3 are front and rear end views, respectively, of the support device of FIG. 1 (with the skin 109 removed). Preferably, the base 102 comprises a material that is relatively stiff in order to resiliently support the user's body weight for an extended time. Generally, this requires a material comprising an impression load deflection (ILD) ratio greater than about 40. In an illustrative embodiment the base 102 comprises a foam comprising an ILD ratio of about 44 and with about a 1.3 pound per cubic foot density. Alternatively, in equivalent embodiments the base 102 can comprise materials selected based on the user's personal preference or body size.

The wedge-shaped base 102 comprises an incline surface 107. Opposing laterally directed wedge-shaped support members 108 extend from the incline surface 107. In FIGS. 2 and 3 the support members 108 are separately formed and joined to the base 102 such as, without limitation, by adhering them together. Alternatively, the support members 108 can be removably attached to the base 102 such as with fabric fasteners such as but not limited to Velcro fasteners. Alternatively, the support members 108 can be removably attached such as with snaps, tabs, buttons, ties, zippers, and the like. By using removable fasteners the support members 108 and/or the base 102 can be changed such as for reason of the user's personal preference or particular use.

As discussed, the base 102 is preferably a relatively stiff material for optimal resiliency under extended loading. However, such a material is not conformable to

the upper body shape for optimal contiguous supporting engagement. A cover 116 of a relatively less stiff material is continuously placed over the support members 108 and over the portion of the incline surface 107 between the support members, the cover 116 thereby supportingly disposed in a concave contour defining the cavity 110.

Illustratively, the cover 116 comprises a viscoelastic foam material with a 10-12 ILD ratio and with 3.8-4 pound density. In this manner, the cover 116 supports the user's upper body and is supported, in turn, by the base 102 and support members 108. The cover 116 can be attached by any of a number of fastening methods such as adhesive or removably attachable fasteners such as but not limited to Velcro, snaps, ties, buttons, tabs, zippers, and the like. By using a removably attachable fastener the cover 116 can advantageously be changed according to a user's personal preference or support needs.

Generally, the support members 108 supportingly engage the user's extremities so as to cradle the upper body within the centrally disposed cavity 110 defined by the base 102 and opposing support members 108. In this manner, the base 102 provides the necessary reclining support against the back and the support members 108 act to envelop the upper body for lateral constraining support. The lateral constraining support supports the body in a neutral position for convalescence, and prevents rolling over onto a convalescing shoulder.

In the embodiment illustrated in FIGS. 1-3 the support members 108 are wedge-shaped. Illustratively, for the thirty inch wide base discussed above, it has been determined that support members 108 having a ten inch run surface 112 and a 5 inch rise surface 114, with the rise surface 114 substantially flush with the edge of the base 102, provides an effective lateral support to the user's upper body and is comfortable for sleeping activity. It will be noted in FIGS. 1-3 the projecting members 108 extend the full longitudinal length of the incline surface 107 of the base 102. Alternatively the projecting members 108 can partially extend therealong.

FIG. 4 is a rear end view of an alternative equivalent embodiment of the present invention. The support members 108A are unitarily formed as portion of the

base 102A; that is, the base 102A and support members 108A are of a one-piece construction.

FIG. 5 is a rear end view of an alternative embodiment of the present invention wherein the support members 108B are radially-shaped.

FIG. 6 is an isometric view of an alternative embodiment of the present invention wherein a shim member 120 is interposed between the base 102 and the support member 108. The shim 120 accentuates the effect of the support member 108 in cradling the user's upper body within the cavity 110 in lateral support thereof. Such an arrangement might be desirable when lateral support is needed particularly in the shoulder portion of the upper body. It will be noted the shims 120 extend only partially along the inclined surface of the base 102; alternatively, the shims 120 can extend fully therealong.

FIG. 7 is a diagrammatic rear view of a user 200 operatively disposed within the cavity 110. The cover 116 cradles the user's upper body by exerting opposing supportive forces generally in directions 201 on the user's shoulders 202. The cradling support urges the user's shoulders to a neutral position, minimizing the amount of strain on a shoulder 202 injury. The cradling support forces 201 furthermore constrain the user's upper body lateral movement, such as is associated with rolling over to one side. FIG. 16 is an enlarged detail portion of FIG. 15 illustrating the manner in which the cover 116, due to it being an elastomeric foam material, and its smooth, non-convoluted surfaces, compresses locally in the area 206 to continuously conform and adaptively change in supporting the shoulder joint 202.

Embodiments of the present invention contemplate a supportive upper body constraint device comprising a base and means supported by the base for constraining the upper body by imparting a supporting engagement continuously molding and adjusting to a shape of the upper body maintaining complete contiguous contact against the upper body. It will be noted the means for constraining explicitly does not contemplate the use of non-contiguous contacting materials such as, without limitation, a convoluted-surface material generally known as "egg crate" type

material. The means for constraining is characterized by a cover comprising a viscoelastic foam material. The means for constraining is characterized by opposing support members on the base supporting the cover in a concave contour defining a central cavity.

It is to be understood that even though numerous characteristics and advantages of various embodiments of the present invention have been set forth in the foregoing description, together with details of the structure and function of various embodiments of the invention, this disclosure is illustrative only, and changes may be made in detail, especially in matters of structure and arrangement of parts within the principles of the present invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed. In addition, although the preferred embodiment described herein is directed to durable medical equipment, it will be appreciated by those skilled in the art that the teachings of the present invention can be applied to other devices, so as to generally form supportive reclining devices, for example, without departing from the scope and spirit of the present invention.